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Final Report

2.4-18

Evaluation of the Effect of Acarine Mite on Honey Bee Colonies in Saskatchewan

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FINAL REPORT

ADF (ERDA) 1.1 - 7 — **Evaluation of the Effect of Acarine Mite on Honey Bee Colonies in Saskatchewan**

ADF (ERDA) 2.4 - 18 — **Tracheal Mite Project**

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EXECUTIVE SUMMARY

Abstract

The impact of tracheal mites (*Acarapis woodi* R.) on the development of honey bee (*Apis mellifera* L.) colonies established as 3 lb packages in northern Saskatchewan was monitored during the summers of 1986 and 1987. High level infestations caused a significant reduction in brood production and thus colony population development, compared to non-infested packages, in both years of the study.

It was concluded that the tracheal mite will be a serious economic pest under Saskatchewan conditions. Treatment with menthol crystals shows promise as a control treatment but is not effective in eradicating infestations. Research needs to continue to develop dosage, application and time management to colonies to obtain optimum efficacy.

Summary

At the time the project was initiated tracheal mites were known to be present in the United States and had not yet been found in Canada. This was the only experiment being conducted in Canada to determine the impact of the honey bee tracheal mite under Canadian conditions.

There was considerable controversy in North America when this pest was first discovered as to whether or not it would be a significant economic pest in North America. Research and beekeeping experience in Europe indicated that European beekeepers were not concerned with this pest. However, when it was first found in Europe there was speculation that it was responsible for large

mortality and economic losses. The results of two years of experimentation at La Ronge indicated that high levels of tracheal mite infestations would have a severe economic impact on the population development and subsequent honey production potential of packaged bees. This was extremely important at the time since Canada was still importing two and three pound packages from the United States. It was felt that as the tracheal mite spread within the United States it would enter the package producing areas and that Canadian beekeepers would eventually receive package bees infected with tracheal mites. This would have a severe economic consequence to beekeepers in Saskatchewan and western Canada who, at the time, were importing up to 200,000 packages per year from the United States.

The results of this experiment was very timely in that it provided a scientific basis for importation policy regarding the import of U.S. packages into Canada. Imports continued from the United States after the infestations were found under a system of quarantine to ensure that mite infested packages did not enter Canada.

Knowing that the tracheal mite is a serious economic pest, once it was found in Saskatchewan colonies which had been established from packages imported in previous years, a serious attempt was made to eliminate the pest. This effort continues in monitoring to ensure that the mite infested colonies are treated with menthol and quarantined to prevent any further spread within Saskatchewan.

TECHNICAL REPORT

The Impact of Acarapis woodi on the Development of Package Bee Colonies

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Introduction

Approximately 200,000 of the 700,000 honey bee colonies operated in Canada during 1986 were started with package bees imported from the United States. Since the discovery of the honey bee tracheal mite, Acarapis woodi in the United States in the summer of 1984, packages continued to be imported into Canada from the United States with certification indicating that the packages originated from sources which were sampled and found to be free of the tracheal mite.

Canadian beekeepers were concerned about the possibility of importing the tracheal mite in package bees. There was concern about the impact that the honey bee tracheal mite would have on wintered colonies. It was not certain what impact the tracheal mite would have on package colonies, on their development and ability to produce a honey crop. The summer season on the prairies is short, allowing only eight to ten weeks from the time a package is installed until the honey flow begins. An initial experiment was conducted in 1986 (Peer et. al. 1987) comparing package colonies infested with tracheal mites and non-infested packages. The comparative trials were repeated in 1987 and are reported here.

Materials and Methods

The experiment was conducted in isolation and under quarantine at La Ronge, Saskatchewan. La Ronge is located 250 km north of Prince Albert and 200 km north of the agricultural area in Saskatchewan. The mite infested packages were installed at the site of a horticulture trial plot. The non-infested packages were initially installed in a separate location.

Both the infested and non-infested packages were started with three pounds of bees and a mated queen. The mite infested packages were obtained from Florida and flown by commercial carriers from Tampa to La Ronge via Winnipeg and Saskatoon. The packages were shipped on pallets with solid bottom boards and were double screened to ensure that no bees escaped in transit.

The packages left Tampa at 11:15 a.m. on April 29 and were hived on May 1, 1987. At installation, the packages all appeared to be in excellent condition with very few dead bees in the cages. The non-infested packages were obtained in California, brought directly to Saskatchewan by truck and were installed in colonies in La Ronge on April 27, 1987. The non-infested packages were also in excellent condition when hived. In both cases the queens were direct released upon installation.

A sample of two to three hundred adult bees was collected from each of the infested packages during installation. 100 bees from each sample were analyzed to determine the initial levels of infestation.

All packages were installed into brood chambers which had 6 of the 9 frames

filled with sugar syrup containing fumagillin at the recommended dosage. On May 7, the original queens were removed from all packages and replaced with sister queens raised from Alberta queen stock and supplied by a commercial queen breeder in California. On May 29, one half of the infected colonies and one half of the non-infected colonies were moved so that there were two apiaries, each containing infected and non-infected package colonies. In one apiary (Yard A) the infected colonies were separated from the control packages by a distance of 50 yards, in the other (Yard B) by 10 yards.

The original queens from the infested packages from Florida were collected and analyzed for the presence of tracheal mites.

Samples of approximately 200 adult bees were routinely collected during the summer from each of the colonies in both the infected and non-infected groups and preserved in 75% alcohol. The samples were analyzed for the presence of Acarapis woodi and Nosema apis.

Tracheal mite analysis was performed by preparing 100 thoracic discs from each sample and placing the discs in 5% KOH solution for 24 hours at 38° C to clear the muscle tissue. The discs were stained with methylene blue (Peng, 1985) and microscopically examined for the presence of mites in the tracheal tubes.

Nosema analysis was performed on 25 bees from each sample by examining the rectal contents, microscopically, for the presence of nosema spores.

Brood measurements were taken by placing a grid over the brood area and

measuring the amount of capped brood on both sides of each frame. Adult bees were first shaken from the frames. The first brood measurements were taken approximately 3 weeks after installation. Subsequent measurements were taken at 14 day intervals until the end of July.

Forty-eight 3-frame nucleus hives, infested with tracheal mites were obtained from Manitoba on March 24, 1987. These colonies were managed during the summer and routinely sampled to monitor the development of the tracheal mite infestations.

All measurements were recorded and organized for statistical analysis (analysis of variance and multiple regression). Treatment differences obtained were accepted as being significant at the $p<.05$ level or higher.

In October 1987, after it was learned that the varroa mite had been found in Florida, each of the packages obtained from Florida was sampled for varroa mites using the ether-roll technique. Approximately 1000 live bees were collected in a jar, a one second burst of engine starting fluid (ether) was injected into the jar, and the bees were shaken and rolled for 30 to 60 seconds. This was repeated, in some instances, until 1 - 2000 bees were sampled per colony. In a few colonies, the entire adult population was sampled first with ether-roll, followed by shaking in detergent solution to determine the level of varroa mite infestation.

Observations and Discussion

1. Infestation Levels

The results of the tracheal mite analysis for the infected package colonies is presented in Table 1 for both apiaries. The infected packages obtained in 1987 had a lower initial infestation rate than did those in the experiments conducted in 1986. The average infestation rates for the experimental packages in 1986 and 1987 as well as the nucleus colonies monitored in 1987 are represented in Chart 1.

Although the initial infestation rates were lower in 1987 there was a similar trend for both experimental years. The initial infestations increased for the first month and a half then declined for a period of time and then increased slowly over the duration of the summer. The reason for the initial increase is likely due to transmission of mites from infected bees to non-infected bees. During the first 21 days there would be no recruitment of young adults to the populations in these packages until the first brood started to emerge. The later infestation decline experienced in both years was likely a result both of mortality of the original adult package bees as well as a simultaneous increase in the population with the recruitment of newly emerged adults.

By contrast, this fluctuation in infestation rates did not occur in the nucleus colonies. In these colonies there was a slow steady increase in the infestation rates (Table 3). The nucleus colonies would not have experienced the same accelerated mortality in adult population in the early spring as the packages and would not have had the rapid change in adult population because of new recruitment of brood. As a consequence, the mite infestation did not fluctuate as with the packages. Infestation rates continued to increase

during the summer as mites migrated from infected bees to non-infected bees.

Analysis revealed that the original adult bees in the packages were heavily infested. Individual infected adult bees usually had 70 or more tracheal mites, in all stages of development, in mostly unilateral tracheal infestations. This changed over the course of the summer as the infestation levels rose in the colony. During the mid-summer and late summer individual bees were not as heavily infested as those in the original packages, usually with 20 or fewer mites. This trend was apparent both in 1986 and 1987.

The non-infested packages which served as controls were monitored for tracheal mites over the course of the summer (Table 2). The original analysis revealed that these packages did not have tracheal mite infestations. However, within one month tracheal mites were found in the control colonies. This was likely a result of infested bees drifting from the infested colonies into the non-infested colonies. This drifting would have been caused with the movement of infested and non-infested bees into the same apiaries and the resultant disorientation that this would have caused. The infestation levels did not increase to any significant amount over the course of the summer and it is felt that the low infestation rates were not likely to have caused any impact during the experimental period.

Colony Development

Fumagillin was fed to all colonies to prevent nosema disease and its impact on brood production. The levels of nosema infestation were lower in 1987 than in 1986. The results of analysis for nosema disease are shown in Table 7. Very

little nosema disease was found in either the infected or non-infected packages and the infestation would not have had a significant impact on brood production.

The queens which came from the packages were removed in both the infested and non-infested packages and replaced with queens from a uniform stock obtained in California. This was done to eliminate any possible differences in brood production due to queen stock.

The capped brood measurements are shown in Table 5 for infested colonies and Table 6 for non-infested colonies. Brood production in 1987 is shown graphically in Chart 2. The results for 1986 brood measurements are shown in Chart 3 for comparison.

Generally speaking, brood production was much greater in 1987 than in 1986. This improvement likely reflected a difference in the summer season since the 1987 summer was much better for the spring buildup of colonies. However, part of the difference may also have been the fact that the infestation rate for the infested packages in 1987 was much lower than the initial infestation rate of the packages obtained in 1986.

In the 1987 experiments there was a significant difference in the amount of brood production between infected and non-infected colonies for all collection dates except for May 29 (second collection date) and July 24 (last collection date). The non-infested colonies produced significantly more brood during the three sample dates in June and early July. This is particularly critical

since it is the brood produced at this time of year which becomes the adult foraging population during the honey flow.

This difference in brood production between infected and non-infected colonies occurred in both 1987 and 1986 experiments. In both years, this difference in brood production was great enough to manifest itself in visibly larger adult bee populations in the non-infested colonies.

General Observations

The infested packages obtained in Florida had new queens introduced into the packages when they were prepared in Florida. These queens were removed shortly after installation when all of the experimental colonies were re-queened. Upon analysis, it was found that six of the 40 queens in the infected Florida packages had tracheal mite infestations. The infestation levels were not high. Less than ten mites were found unilaterally in each of the queens. It was not possible to determine if the queens were infested at source or if they became infested after being installed into the infested packages.

The varroa mite was found in samples taken from one of the infected apiaries on October 13, 1987. All of the colonies in the project were sampled during October 15 - 16, 1987. The project was terminated on October 21, 1987 and all colonies were destroyed.

All of the infected colonies received from Tampa in the spring of 1987 were sampled. Six of the colonies appeared not to have any varroa mites and all of

the others were positive. All of the control colonies from California were also sampled. All of these colonies did not have varroa mites with one exception, a hive in which one varroa mite was found which was likely caused by drift from infected colonies within the same apiary.

The number of varroa mites found was very low (Gruszka, 1987). The largest number of varroa mites found in one hive was 70. The average varroa infestation was estimated to be approximately 15 mites per hive. It is extremely unlikely that the low level initial infestations had any impact on colony development during the course of the experiment.

Menthol was applied to four colonies to determine if tracheal mites could be controlled. The results are shown in Table 8.

Four different treatments were applied to four individual colonies. The first treatment involved the use of 50 g packets of menthol crystals placed on the bottom board in one colony and on the top bars in the second. The packets were exchanged after 14 days when it was found that the packet on the bottom board was being covered with propolis and hive debris.

Two other treatments were initiated on July 30. The dosage of menthol was increased at this time since the weather had become cool and not ideal for evaporation. In all four treatments, it was found that the temperatures were not sufficiently high enough for much evaporation of the crystals to occur. More than 75% of the menthol installed in the colonies remained in the colonies at the end of the trials.

It was noticed that the bees removed brood within two inches of the menthol crystals. This was particularly evident where the menthol was applied in dishes and placed immediately on the top bars. The bees removed the brood immediately below this menthol. This was not as evident when the menthol was applied in packets. Perhaps the foil caused the menthol fumes to be distributed in a different fashion.

In the experiment where 50 g of menthol was applied, the infestation in one of the colonies did drop to non-detectable. In the other three colonies, mites were still detected at the end of the menthol treatment although the mite infestation levels were reduced from the initial levels. At the same time, infestation rates in non-menthol treated colonies increased, so that the menthol appeared to be impacting the mite levels in the colonies.

Conclusions

In both years that the experiment was conducted there was a significant difference in brood production between infected and non-infected package colonies.

The same fluctuation in infestation levels during the summer was witnessed in both years. However, by the end of the season, the mite levels had increased to high levels.

The two seasons in which the experiments were conducted were different. The 1986 season was much poorer for colony buildup than the 1987 season. During 1986 colony development was so poor in the infested packages that the colonies did not get strong enough to fill one brood chamber. In 1987 the colonies did much better and were able to fill two brood chambers with brood and bees. The tracheal mite infestation continued to climb during the summer, in some cases, very dramatically. This trend was also noted in the nucleus hives which started with low level infestations and increased dramatically during the course of the summer.

Furgala et al (1989) demonstrated that levels of mite infestation of 40% or more in colonies in Minnesota caused high winter mortality. These levels were reached by half of the colonies in both the package colonies and the nucleus hives. Since Saskatchewan winters are as severe as those in Minnesota (if not more so because of the longer duration of the winter) it is likely that the levels of mite infestation exhibited in both years of the study would have

caused extremely high winter mortality.

It is the opinion of the authors that the tracheal mite is a serious pest which can be economically detrimental to beekeeping in Saskatchewan and other parts of Canada. Depending on the severity of the infestation the impact will be felt in the first year in reduced colony development and lower honey production or in subsequent years by increased winter mortality.

Menthol may prove to be effective in combatting mite infestations. However, its effectiveness is very dependent on ambient temperatures. The initial trials indicate a reduction in mite levels. More work needs to be conducted to determine dosage rates and delivery systems to provide optimum evaporation and maximum control.

Acknowledgements

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Table 1. Infestation Levels (%)* - Infested Package Colonies 1987

Colony Number	May 1**	June 3	July 8	August 7	September 23	October 15
Yard A						
1	38	43	12	8	23	14
3	17	53	46	37	53	51
5	54	67	15	15	12	***
7	56	84	67	37	43	39
9	50	60	45	32	31	34
11	29	56	25	24	22	30
13	30	51	17	71	91	***
15	41	57	17	16	15	23
17	32	41	8	7	9	7
19	27	57	38	23	46	55
21	28	52	43	18	24	31
23	16	32	40	21	50	63
25	19	52	47	38	72	47
27	36	61	61	25	64	84
29	40	63	27	29	34	37
31	15	35	61	26	19	35
33	16	36	23	29	40	43
35	23	38	30	39	47	61
37	27	68	5	22	30	37
Yard B						
4	14	60	46	21	12	9
6	17	44	15	22	30	12
10	22	27	61	41	39	49
12	28	37	42	65	39	80
16	27	57	33	42	27	***
18	16	28	22	32	62	40
20	25	47	29	15	13	11
22	18	53	60	19	41	38
24	34	68	75	19	38	63
28	19	43	50	53	85	***
32	35	43	27	19	16	23
34	29	34	48	54	62	76
36	24	30	44	54	75	73
38	16	41	22	10	29	***
Average Yard A	31.3	52.9	33.0	27.2	38.2	40.6
Average Yard B	23.1	43.7	41.0	33.3	40.6	43.1
Average Both Yards	27.2	48.3	37.0	30.2	39.4	41.8

* 100 bees examined from each sample

** Package colony installation date

*** Colonies used for another experiment

Table 2. Infestation Levels (%)* - Control Package Colonies 1987**

Colony Number	May 1	June 3	July 8	August 7	September 23	October 15
Yard A***						
C 1						1
C 3		1			2	1
C 5						7
C 7				1	3	1
C11						
C13				1		
C15						
C17						
Yard B****						
C 2				2		2
C 4						
C 6				1		
C 8					1	
C10			1			
C12						
C14						3
C16						2
C18				1		
No. of Col. Infested Yard A	0	1	0	2	2	4
No. of Col. Infested Yard B	0	0	1	3	1	3
Total Cols. Infested	0	1	1	5	3	7

* 100 bees examined from each sample

** Installed April 27

*** Located 150 feet from infested colonies

**** Located 30 feet from infested colonies

Table 3. Infestation Levels (%)* - Infested Manitoba Nuclei Colonies 1987

Colony Number	March 16	June 3	July 20	August 7	September 23	October 21
M 2	1	3	19	23	49	**
M 3	1	0	1	1	3	6
M 4	6	16	6	24	20	60
M 5	0	3	8	12	34	31
M 8	0	**	1	5	4	10
M 9	10	13	37	37	72	83
M10	4	0	0	1	53	53
M11	2	0	0	1	2	2
M12	0	4	12	52	95	94
M13	0	4	22	67	85	95
M14	1	0	0	0	2	0
M15	8	5	10	13	23	24
M16	6	4	9	15	41	52
M17	0	1	3	2	4	17
M20	9	25	45	37	84	92
M21	0	0	3	0	7	3
M23	4	0	0	0	0	0
M24	1	**	3	2	9	31
M25	2	2	1	0	6	2
M27	0	0	0	0	0	1
M28	0	0	0	4	2	3
M29	5	14	32	61	83	69
M30	0	0	3	0	10	9
M31	2	4	7	26	46	51
M32	15	11	7	11	24	44
M33	4	13	8	16	49	56
M35	1	5	1	3	5	11
M37	1	1	6	3	7	6
M38	0	7	8	7	27	43
M39	0	0	1	0	1	6
M40	0	3	16	7	58	51
M48	1	2	0	1	10	4
Average	2.6	4.7	8.4	13.5	28.6	32.5

* 100 bees examined from each sample

** Sample not taken

Table 4. Capped Brood Measurements (sq. in.) – Infested Package Colonies 1987

Colony Number	May 20	June 3	June 17	July 1	July 15	July 29	TOTAL
Yard A* Infested							
1	271	450	381	682	495	611	2890
3	177	643	510	747	642	470	3189
5	223	397	366	553	811	840	3190
7	265	432	347	524	642	735	2945
9	248	637	403	713	648	704	3353
11	271	467	468	560	634	715	3115
13	113	577	401	601	609	578	2879
14	189	319	268	515	543	854	2688
17	248	420	400	677	710	673	3128
19	191	463	338	519	544	780	2835
21	212	722	392	684	647	778	3435
23	228	496	488	708	874	923	3717
25	175	604	471	625	608	733	3216
27	240	481	350	443	662	606	2782
29	240	484	415	527	619	764	3049
31	214	383	274	411	696	892	2870
33	223	443	350	420	589	698	2723
35	206	349	349	437	617	730	2688
37	167	389	327	572	856	876	3187
Yard B* Infested							
4	250	437	392	829	704	828	3440
6	276	787	384	868	780	870	3965
10	279	512	363	828	840	825	3647
12	313	600	363	667	620	661	3224
16	149	316	183	367	268	702	1985
18	175	386	267	711	799	927	3265
20	246	367	369	804	816	854	3456
22	251	508	467	936	780	862	3804
24	245	436	315	735	705	831	3267
28	240	544	405	758	783	764	3494
32	248	423	324	584	651	806	3036
34	281	488	281	727	730	812	3319
36	186	338	307	584	723	719	2857
38	197	567	339	792	909	881	3685
Average Yard A	215.8	481.9	384.1	574.6	655.1	734.7	3046.3
Average Yard B	238.3	479.2	339.9	727.9	722.0	810.1	3317.4
Average Both Yards	225.4	480.8	365.4	639.6	683.5	766.7	3161.3

*Installed May 1

Table 5. Capped Brood Measurements (sq. in.) - Control Package Colonies 1987

Colony Number	May 15	May 29	June 12	June 26	July 10	July 24	TOTAL
Yard A* Non-infested							
C 1	291	481	674	727	684	833	3690
C 3	273	432	619	1059	653	664	3700
C 5	284	408	569	848	791	892	3792
C 7	284	532	880	944	946	935	4521
C11	267	564	699	938	752	735	3955
C13	287	451	711	947	904	958	4258
C15	318	380	574	880	806	785	3743
C17	237	431	505	963	659	738	3533
Yard B* Non-infested							
C 2	267	426	403	938	713	923	3670
C 4	333	507	575	897	791	808	3911
C 6	267	465	423	922	786	916	3779
C 8	271	450	417	947	817	791	3693
C10	301	415	384	812	764	808	3484
C12	267	420	460	854	781	859	3641
C14	248	384	493	777	754	881	3537
C16	299	513	636	1040	888	991	4367
C18	319	512	524	778	623	563	3319
Average Yard A	280.1	459.8	653.9	913.2	774.4	817.5	3899.0
Average Yard B	285.8	454.7	479.4	885.0	768.6	837.8	3711.2
Average Both Yards	282.9	457.3	566.7	899.1	771.3	828.2	3799.6

* Installed April 27

CHART 1 : AVERAGE TRACHEAL MITE INFESTATION LEVELS

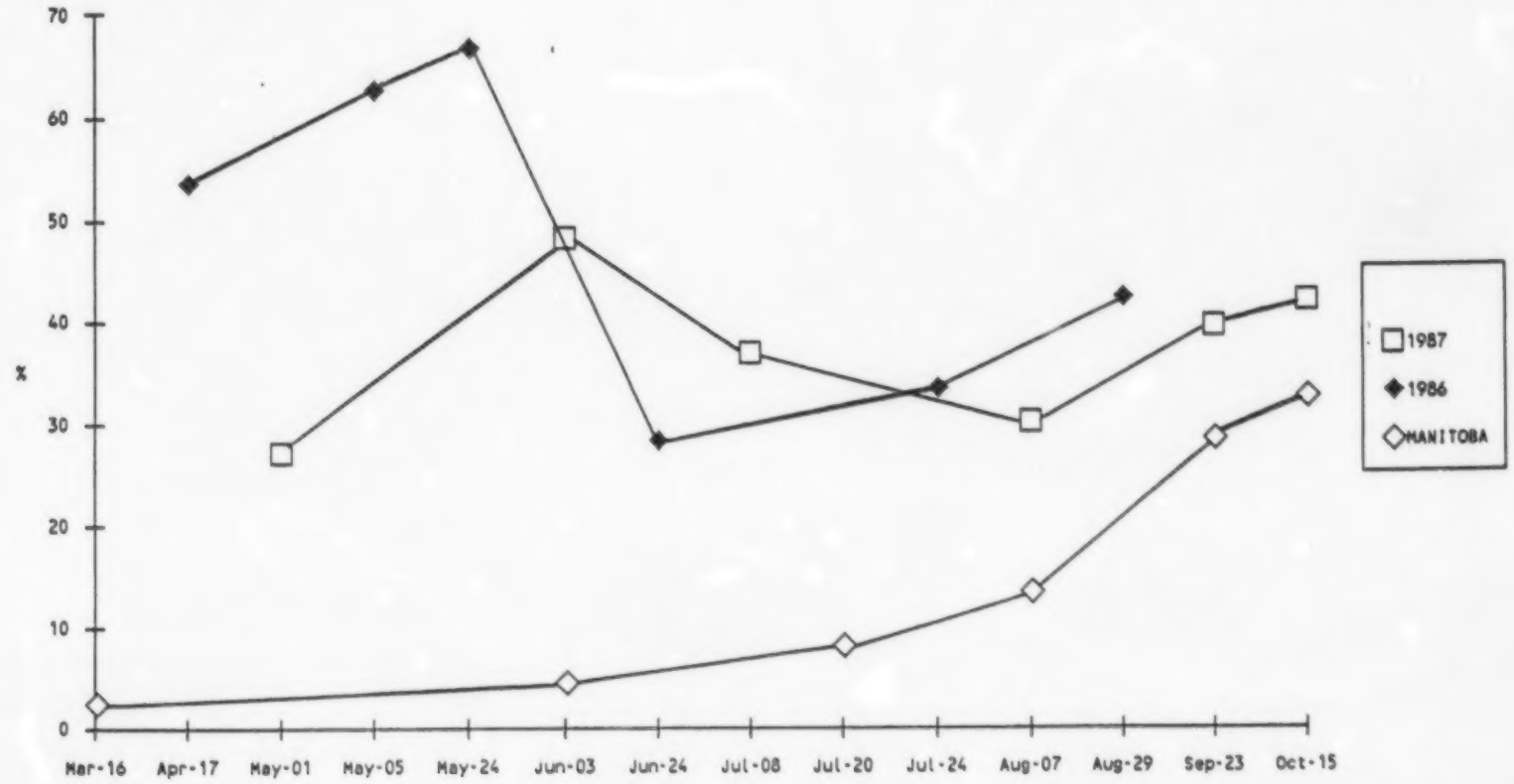

CHART 2: AVERAGE BROOD AREA FOR CONTROL AND INFESTED COLONIES IN 1987

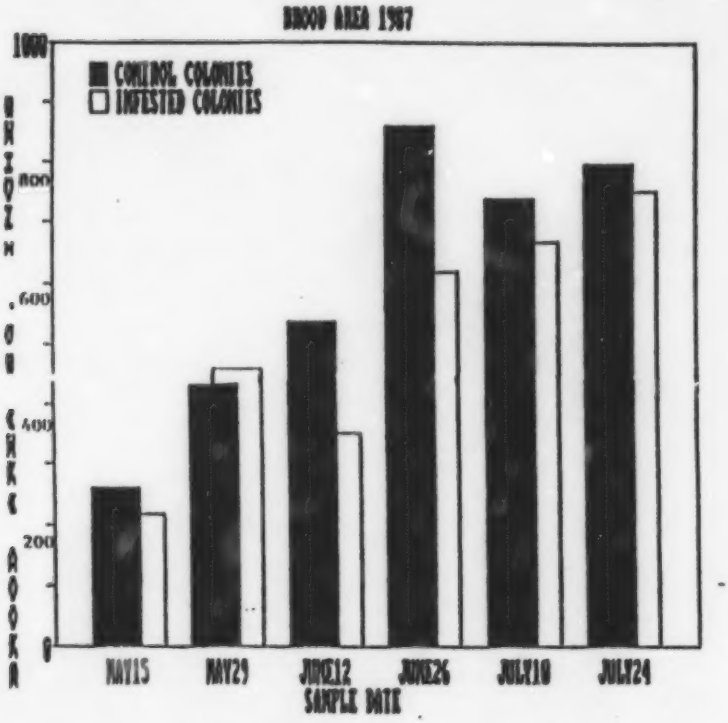

CHART 3: AVERAGE BROOD AREA FOR CONTROL AND INFESTED COLONIES IN 1986

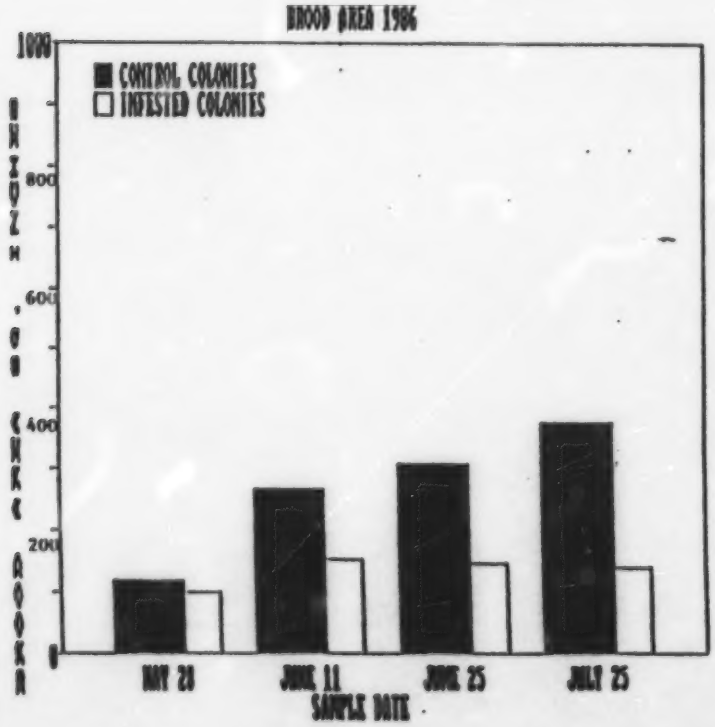

Table 6. Nosema Infection Levels (%)* – Package Colonies 1987

Colony Number	May 1	June 3	July 8	August 7	September 23	October 15
Yard A (Inf.)						
1		4				
3		15.4 (13)				–
5		–		4	4	
7						
9		18.2 (11)				8
11		27.8 (18)				
13	4	27.8 (18)		4		
15		4		8		
17		8		4		
19		8		4		
21		8				
23					4	
25		48				
27	–	12				
29		4				
31		6.7 (30)	4	4	4	
33		4	8			
35		8	4.4 (23)		4	
37		20		8	4	
Average		11.8				
Yard B** (Inf.)						
4		4.4 (23)			16	
6						
10						
12		16				–
16		9.1 (11)				
18		4	12.5 (8)			
20		16		4		
22		4				
24				4	4	–
28		20				
32	4	4				
34		36				
36			4	4	4	
38		28			4	–
Average		10.1				

* 25 bees examined from each sample except ( )

( ) Number of bees examined

** Installed May 1, 1987

– No sample

Table 7. Nosema Infection Levels (%)* – Package Colonies 1987

Colony Number	May 1	June 3	July 8	August 7	September 23	October 15
Yard A (Non-Inf.)						
1	–	8				
3	–					
5	–				4	
7	–	8			20	
11	–					
13	–	4.8 (21)		4		
15	–	4				
17	–	4			4	
Average		3.6				
Yard B (Non-Inf.)						
2	–	12				
4	–					
6	–					
8				4		
10		4				
12	–				4	
14	–					
16	–			4		
18	–	6.3 (16)		4	16	
Average		2.5				

* 25 bees examined from each sample except ( )

( ) Number of bees examined

** Installed April 27, 1987

– No sample

Table 8. Infestation Levels (%)* – Menthol Treatments 1987

Col. #	May 1	June 3	July 8	July 30	Aug. 7	Aug. 13	Aug. 26	Sept. 23	Oct. 15
26 (1)	41	55	29		0	0		0	0
40 (2)	38	52	48		14	23		5	12
14 (3)	11	40	26	21	10	13	1	3	1
30 (4)	19	49	30	57	30	7	8	2	1

* 100 bees examined from each sample

(1) 50 gram packet menthol crystals on bottom board July 13, exchanged after 14 days, removed day 32.

(2) 50 gram packet menthol crystals on top bars July 13, exchanged after 14 days, removed day 32.

(3) 2-50 gram packets menthol crystals on bottom board plus 2 packets on top bars July 30, exchanged after 15 days, left until October 15.

(4) 2-50 gram dishes solid menthol on bottom board plus 2 dishes on top bars July 30, exchanged after 15 days, left until October 15.

TECHNOLOGY TRANSFER

The results of the experimentation at La Ronge were published in Beelines in the following articles:

Beelines 1987. Peer, D., Gruszka, J., and Tremblay, A. Preliminary Observations on the Development of Acarapis woodi on the Development of Package Bee Colonies. #81

Beelines 1987. Gruszka, J. Examination of Sampling Methods to Detect Low Level Infestations of the Honey Bee Tracheal MIte. #81

Beelines 1988. Gruszka, J. Evaluation of the Ether Sampling Method to Detect Low Level Infestations of Varroa jacobsoni.

These publications were reprinted in provincial extension publications and newsletters across Canada. Several of the articles were also reprinted in beekeeping journals in North America including Canadian Beekeeping and The Speedy Bee published in the United States. The articles were abstracted in Apicultural Abstracts which is published by the International Bee Research Association in the United Kingdom. As a result of this listing in Apicultural Abstracts, requests for reprints have come from around the world.

Presentations of the research findings were made at the following meetings:

2nd International Symposium on Africanized Bees and Parasitic Bee Mites
Tucson, Arizona, January 1986

3rd International Symposium on Africanized Bees and Parasitic Bee Mites
Edmonton, Alberta, October 1987

Honey Bee Tracheal Mite Symposium, St. Paul, Minnesota, July 8-9, 1986

Apiary Inspectors of America Annual Meeting, Biloxi, Mississippi, Jan. 26-28, 1987

Canadian Honey Council Annual Meeting, Charlottetown, PEI, November 20, 1986

American Bee Research Conference, Weslaco, Texas, October 1989

Saskatchewan Beekeepers Association Annual Meeting, Saskatoon, Feb. 1986, 1987, 1988

Manitoba Beekeepers Association Annual Meeting, Winnipeg, Feb. 1987, 1988

Alberta Beekeepers Association Annual Meeting, Edmonton, Nov. 1986, 1989

Canadian Association of Professional Apiculturists Annual Meeting, Edmonton, Nov. 1987

PERSONNEL

The project was supervised by Dr. Don Peer of Nipawin, Saskatchewan on behalf of the Saskatchewan Beekeepers Association. The project co-ordination and most of the field work was conducted by Dr. Peer, Alan Tremblay and John Gruszka. Operation of the research project took approximately 10% of the time from other duties.

There were a number of technicians who were hired during the course of the project. In 1986 these included Ross Weiss, Carmen Engele and Brian Ravndahl who devoted 100% of their time to the project. In 1987, technicians Kerry Clarke, Carmen Engele, Brian Ravndahl and Coby Demkiw-Bartel devoted 100% of their time to the project.

EQUIPMENT

The following equipment was purchased during the life of the project:

Microscope - Nikon - $1409.00

Sample jars (approximately 1,000) - $2,098.95

The beekeeping equipment used on the project was all donated by individual beekeepers in Saskatchewan. At one point in the project, 300 honey supers were purchased. These were sold at the conclusion of the experimentation and the monies returned to the research account.